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## RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL SECTOR GHG REDUCTION POLICY OPTIONS

CCAG MEETING #2, SEPTEMBER 29, 2005

<b><u>Indicative Potential Emission Reductions* -</u></b>	<b><u>Indicative cost (\$/tCO<sub>2</sub>e)</u></b>
<b>High (H):</b> Potentially capable of saving at least 1 Million Metric Tons CO <sub>2</sub> e per year by 2020 (~1% of current AZ emissions)	<b>High (H):</b> \$50/tCO <sub>2</sub> e or above
<b>Medium (M):</b> Potentially capable of saving from 0.1 to 1 Million Metric Tons per year by 2020	<b>Medium (M):</b> \$5-50/tCO <sub>2</sub> e
<b>Low (L):</b> Unlikely to yield more than 0.1 Million Metric Tons CO <sub>2</sub> e per year by 2020	<b>Low (L):</b> \$5/tCO <sub>2</sub> e or lower
<b>Uncertain (U):</b> Too many unknowns to estimate at this time	<b>Negative (Neg):</b> Cost Savings
* Several measures may overlap in terms of the emissions reductions. Estimates assume measures would be implemented independently from other measures.	

### Indication of Priorities:

- **High:** High priority items are deemed deserving of considerable further analysis.
- **Medium:** Medium priority items will be carried forward, with the extent of further consideration and analysis to be determined later.
- **Low:** Low priority items will be moved to a separate list as options to be potentially considered at a later time.

		Priority: High, Med, Low	Implement. Level	Potential Emission Reductions	Cost (\$/tCO <sub>2</sub> removed)	Co-benefits, Feasibility Considerations and Other Factors
<b>1.</b>	<b>Energy Efficiency Programs, Funds, and Goals</b>					
1.1	Utility Demand Side Management (DSM) Programs for electricity, natural gas, propane, fuel oil	High	Utility and/or contractor or ESCO	H	Neg/Low	Co-benefits include transmission/distribution system costs reduction. Significant potential overlap with many other options.
1.2	Energy Efficiency Funds (e.g. Public Benefit Funds) administered by State agency, utility, or 3rd party (e.g. Energy Trust)	High	State, regulator	H	Neg/Low	[As above]
1.3	Energy Efficiency Requirements (e.g. Utility Savings Goals or Energy Portfolio Standards)	High	State, utility, regulator	H	Neg/Low	[As above]
1.4	Market transformation and technology development programs	High	Federal, State, local	H	Neg/Low	
<b>2.</b>	<b>Appliance Standards</b>					
2.1	Expansion of State-level Appliance Efficiency Standards	High	State, regional	L/H	Neg/Low	Feasibility enhanced by ongoing effort to adopt California standards
2.2	Support for Federal-level Appliance Efficiency Standards	High	State, regional	L/H	Neg/Low	Potential overlap with previous option

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<b>3.</b>	<b>Buildings</b>					
3.1	Improved Building Codes	High	Local	H	Neg/Low	Potential to also yield water savings, comfort/air quality improvements. Code changes advanced in some localities, beginning in others.
3.2	Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings)	High	State, local	M/H	Neg/Low	Potential overlap with previous option. Also overlap with technology-specific options, and other building-related options. Co-benefits as above, plus urban design, market transformation, and other benefits. Complementary approach to building codes, which set a compulsory minimum, whereas LEED-type activities are voluntary.
3.3 (merge prev. 3.3-3.6)	Training and Education Programs and Certification for Building Planners, Builders/Contractors, Energy Managers and Operators, and Local Officials	Medium/ High	State, local	M	Neg/Low	Some overlap with previous options in Buildings category, and also highly complementary to those options.
3.4 (prev. 3.7)	Increased use of blended cement (substituting fly ash or other pozzolans for clinker reduces CO <sub>2</sub> emissions)	Low	State, local, industry	L/M	Neg/Low	May provide modest avoided waste disposal co-benefit, depending on standard practice
3.5 (prev. 3.8)	Reduction of emissions from diesel engines used in new construction developments	Low	Local, builders	L	Low	There are practical issues associated with providing sufficient sets of temporary switchgear at the times and places they are needed to serve a significant portion of an extremely active building market with grid electricity.
<b>4.</b>	<b>Education and Outreach</b>					
4.1 (old 2.1.1)	Consumer education programs	Medium/ High	State, local	?	Neg/Low	Potential contribution difficult to estimate
4.2 (old 2.3.3)	Introduce in School Curriculum	Medium/ High	State, local	?	Neg/Low	Potential contribution difficult to estimate, but recognized as a necessary long-term effort with results that will accrue over the longer-term.

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<b>5.</b>	<b>Pricing and Purchasing</b>					
5.1	Green Power Purchasing Offers to Consumers beyond Green Power Included in Utility RPS	Low	Utilities	?	M/H	Interaction with RPS option a concern. Utility adherence to an RPS of green power purchase considered more effective than voluntary offers to consumers.
5.2	Bulk Purchasing Programs for Energy Efficiency or other Equipment (Public or Private sector)	Low	Local housing agencies, others?	L/M	Neg/Low	May interact with utility programs.
5.3	Net-metering policies	Medium/ High	State, local, utilities	M	Neg/Low	Will have substantial impact on uptake of both renewable energy technologies (solar PV) and combined heat and power. (See note on TOU rates below.) Potential changes in emissions set at medium level, but note that achieving M level of reductions may take time.
5.4	Time of Use (TOU) Rates	Medium/ High	State, utilities	M	Neg/Low	Significant utility system co-benefits (transmission and distribution system). Would also significantly interact with and increase effectiveness of net metering policies. Potential changes in emissions set at medium level, but note that achieving M level of reductions may take time

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<b>6.</b>	<b>Technology Specific Policies</b>					
6.1	Incentives for Renewable Energy Applications (Solar roofs, water heaters, etc.)	Medium	State, utilities	H	M/H	Programs could help to lower capital and installation costs. Incentive and other programs already underway at utility, state levels.
6.2	Clean Combined Heat and Power	High	State, utilities, industries	H	Neg-M	Cost dependent on price of natural gas; interconnection an issue; utility system co-benefits. Note interaction with TOU rates and Net Metering policies.
6.3	Promotion and Tax or Other Incentives for EnergyStar and better appliances and equipment	Medium/High	State, utilities	H	Neg/Low	Interaction with appliance standards, utility programs.
6.4	Appliance Recycling/Pick-Up Programs	Low	State, local, utilities	L	Neg/Low	Long-term impact uncertain
6.5	White Roofs, Rooftop Gardens, and Landscaping (including Shade Tree Programs)	Medium	Local??	M/H	Neg/Low	Results likely to vary substantially with design. Implementation may be difficult. Likely to interact with building options such as LEED (option 3.2). If widely implemented may have favorable impact on local climate, for example, nighttime temperatures.
6.6	Focus on specific end-uses/technologies: window AC units, lighting, water heating, plug loads, networked PC management, power supplies, motors, pumps, boilers, etc). Consumer products programs, may include incentives, retailer training, marketing and promotion, education, etc	TBD	State, local, utilities	(By option, range from L to H)	Neg/Low	Interaction with appliance standards, utility programs.

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<b>7.</b>	<b>Non-Energy Emissions (HFCs, PFCs, SF<sub>6</sub>, CO<sub>2</sub> process Emissions)</b>					
7.1	Participation in Voluntary Industry-Government Partnerships	TBD	State, industries	?	Neg/Low	
7.2	Process Changes/ Optimization	TBD	State, industries	?	?	Impact, cost likely highly process-specific.
7.3	Leak Reduction /Capture, Recovery and Recycling of Process Gases	TBD	State, industries	M	?	
7.4	Use of Alternative Gases (other HFCs, hydrocarbon coolants, etc.)	TBD	Federal, state, industries	M/H	L/M	
7.5	Cement Industry: use of alternative fuels	TBD	State, industries	?	L/M	
<b>8.</b>	<b>GHG Emissions- Specific Goals and Policies</b>					
8.1	Support for switching to less carbon-intensive fuels (coal and oil to natural gas or biomass)	TBD	State, utilities	M/H	Neg/M	Cost dependent on relative fuel prices
8.2	Industry-Specific Emissions Cap and Trade Programs	TBD	State, industries	M/H	L/M	Highly dependent on specification of trading systems
8.3	Voluntary emissions targets	TBD	Industries	?	?	
8.4	Negotiated Emissions or Energy Savings Agreements	TBD	?	?	?	

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<b>9.</b>	<b>Other</b>					
9.1	Government Agency Requirements and Goals (including procurement)	TBD	Federal, state, local	?	Neg/Low	Potential overlap with other options
9.2	Focus on specific market segments: existing homes (weatherization), new construction, apartments, low income, etc.	TBD	State, local, utilities	M/H	Neg/Low	Potential overlap with other options
9.3	Reinvestment Fund	TBD	?	?	Neg/Low	Potential overlap with other options
9.4	Municipal Energy Management	TBD	Local	?	?	Potential overlap with other options
9.5	Focus on Small and Medium Enterprises (SMEs)	TBD	State, local, utilities	?	?	Potential overlap with other options
9.6	Industrial ecology/ by-product synergy	TBD	?	?	?	
<b>10.</b>	<b>Solid Waste and Wastewater Management</b>					
10.1	Solid Waste Source Reduction	TBD		M/H	?	
10.2	Solid Waste Recycling	TBD		H	?	Materials recovery, reduction of energy requirements for raw materials production
10.3	Separation and Composting of Organic Materials in Solid Wastes	TBD		?	?	Co-production of soil amendments
10.4	Capture/Use in buildings or industry of Methane from Landfills	TBD		?	?	Fossil fuel displacement a co-benefit
10.5	Capture/Use of Methane from Wastewater Treatment	TBD		?	?	Fossil fuel displacement a co-benefit